California Climate Watch

A monthly newsletter monitoring California climate

October 2004
http://www.calclim.dri.edu

Summary of the Month

by Bill Mork
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October 2004 was cool and unseasonably wet with a mean upper level trough of low pressure near the West Coast and an active low latitude storm track which produced record October rainfall totals in much of Southern California. Preliminary data show the statewide average temperature in October to be 58.3 degrees, 2.4 degrees below normal, and more like November at many locations on the South Coast which averaged 3.6 degrees below normal. Departures from normal average temperatures were as much as -5.6 degrees at Culver City, -4.7 degrees at Alpine and Porterville, and -4.4 degrees in downtown Los Angeles. Rain at San Diego on the 17th (0.09 inches) ended its record consecutive-day rainless streak at 182 days, April 18 to October 16, with records going back to 1850.

There were three major storms which brought precipitation to most of the State, with heaviest totals in Southern California, centered on October 16-18, 19-21, and 26-28. There were record daily rainfall totals at many locations on all days included in these stormy periods. The most extreme rainfall event in the Southland was on October 19-20 in Los Angeles County when Opids Camp received 4.95 inches in 3 hours, 12.79 inches in 24 hours, and 14.63 inches for the storm in a 48-hour period. The 24-hour total of 12.79 inches rivals the greatest daily rainfall amount on record for October in California of 14.11 inches at Boulder Creek in Santa Cruz County, according to Jim Goodridge, 1992, "A Study of 1000-Year Storms in California". The Opids Camp 24-hour total seems to easily outgun the previous Southland October record of 7.58 inches at Encinitas in 1889. The peak 24-hour rainfall total in San Bernardino County on October 19-20 was 10.83 inches at San Sevaine Spreading Ground. One of the heaviest major city daily totals was 2.70 inches at San Diego Lindbergh Field on October 27, the fourth wettest day since 1850 in San Diego and the wettest day since 2.71 inches fell on February 6, 1937.

***WEATHER** continued on page 2.*

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The Santa Ana Wind

By Dan Cayan, Larry Riddle, Tony Westerling, Emelia Bainto and Mary Tyree
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The Santa Ana is the name given to foehn-like winds in Southern California, which result when a cool, dry air mass flows down slope from high elevation basins in the western North American interior toward lower atmospheric pressures off the Pacific coast. This flow is funneled toward passes in the Southern California coastal ranges by the higher Sierra Nevada range in the west and the Rocky Mountains to the east. As the air sinks, it is compressed, warming it and reducing its relative humidity. Compression of this air mass through mountain passes often produces winds of 40-60 kilometers per hour, and in extreme cases may yield wind speeds in excess of 100 kilometers per hour. It has been reported that the name "Santa Ana" originated from settlers at Santa Ana who found themselves in the path of these strong dry winds as they funneled through the gap between the San Bernardino and the San Gabriel Mountains.

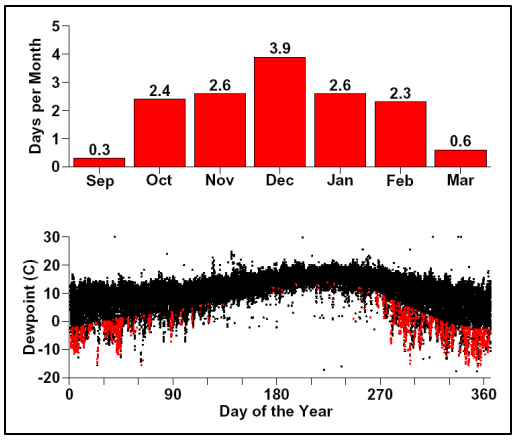


Figure 1. Average number of Santa Ana events per month and average daily dewpoint.

We use an index of three different weather parameters to detect Santa Ana conditions. These parameters are extracted from airport weather observations collected at selected stations. These parameters include a) the sea level pressure difference (must be relatively high) between a location in the Great Basin and one in Southern California, b) the humidity of the air at the surface (must be unusually low) in Southern California, and c) the direction of the wind at or near the surface (must be in the sector between north-northwesterly and southeasterly). Archived weather conditions at Miramar air station, approximately 10km inland from the coast in the San Diego region, along with barometric pressure from Ely, in central eastern Nevada, allow us to construct a history of Santa Anas over the last several years. As shown in Figure 1 (upper bar graph and lower scatter plot), Santa Anas are most common during fall and winter, peaking in December. Under the definition employed here, there are very few Santa Anas between April and late September, as can be seen by the Santa Ana plot (red dots) in the lower panel of Figure 1. Ironically, the low humidities that accompany Santa Anas are most prevalent during the Southern California cool season, during interludes between periods when the region experiences most of its rainfall. This is because the source of Santa Ana flows is in the Great Basin, often in the dry air behind cold fronts. As this dry air flows coastward into Southern California, it descends from a high plateau to lower elevations. Adiabatic compression from the higher pressure environment in the coastal region causes the air to warm, and this produces an air mass with extremely low relative humidity.

From a composite of atmospheric circulation from nine strong Santa Ana events during the last decade (Figure 2), the environment that produces these events encompasses a footprint spanning the North Pacific and North America, even though the symptoms are perceived to be somewhat local.

***SANTA ANA** continued on page 2.*

INSIDE THIS ISSUE:

WEATHER (continued from page 1):

These extremely heavy rains created urban and local flash flooding, but very accurate National Weather Service quantitative precipitation forecasts likely were mitigating factors in the minimal casualty and damage figures in Southern California.

The big story for October is the monthly rainfall totals which set records at many locations in Southern California. The 4.98 inches at San Diego was the wettest October since records commenced there in 1850. October's 4.56 inches in downtown Los Angeles was second only to the 6.96 inches in October 1889. October totals of 2.45 inches at Fresno and 1.54 inches at Bakersfield tied for the fourth wettest Octobers on record at both locations. The month's total of 3.09 inches at Sacramento was the fifth wettest October since records began there in 1850. The 6.89 inches at Santa Ana won the award for multiples as that total was over 19 times the normal of 0.36 inches.

Other record October totals we know of include 10.50 inches at Lake Elsinore, 9.74 at Glendale 3N, 7.65 at Idyllwild, 7.62 at Lodgepole, 7.56 at Glendale, 7.45 at Big Bear Lake, 5.90 at Escondido, 5.57 at Burbank, 5.43 at San Luis Obispo, 5.34 at Long Beach, 5.33 at Morro Bay, 5.24 at UCLA, 5.23 at Ojai, 5.10 at Lompoc, 5.05 at Burbank Airport, 4.96 at Alpine, 4.74 at Santa Paula, 4.54 at Fullerton, 4.21 at Riverside Citrus, 4.07 at Culver City, 3.90 at Paso Robles, 3.78 at LAX, 3.43 at Santa Barbara, 3.38 at King City, 3.35 at Sandberg, 2.79 at Salinas, 2.44 at Hollister, and 2.32 inches at Santa Maria.

The Central Sierra Snow Lab at Soda Springs (Donner Summit) caught 17 inches of snow on October 26 with 24 inches on the ground. The total month's snowfall of 48 inches was the snowiest October since records began in 1945; the previous record was 36 inches of snow in 2000. Two more feet of snow on the 26th at Squaw Valley, on top of 6 feet of snow in the previous week, triggered the earliest opening of the ski season on October 30. The Sugar Bowl ski resort also had its earliest opening ever on October 30 after getting two feet of fresh snow on the 26th.

On a drier note, there were two major Santa Ana events in Southern California in October 2004. On October 11-12, an upper level low pressure area dropping southwest of Los Angeles produced strong offshore winds which pushed the temperature to 93 degrees at Chatsworth on October 12. The other event was on October 31 with gusts to 53 mph at Cheeseboro.

SANTA ANA (continued from page 1):

The 700mb height anomalies shown in the two panels of Figure 2 indicate that these events are set up several days in advance of the occurrence of Santa Ana conditions, when low 700mb height (or low pressure) develops in the Gulf of Alaska north of unusually high 700mb heights (or high pressure) further south in the eastern North Pacific offshore of California. The observed Santa Ana conditions appear 5 days later, when this high pressure system intensifies and migrates eastward and northward over the West Coast, with the center of the 700mb height anomalies seated over the coast of Washington state. The anticyclonic (clockwise) flow of winds around this high-pressure region results in the northeasterly winds (meteorologists name winds based on source direction) that are characteristic of Santa Anas. While they frequently last for only a day, Santa Anas often persist for four days or more.

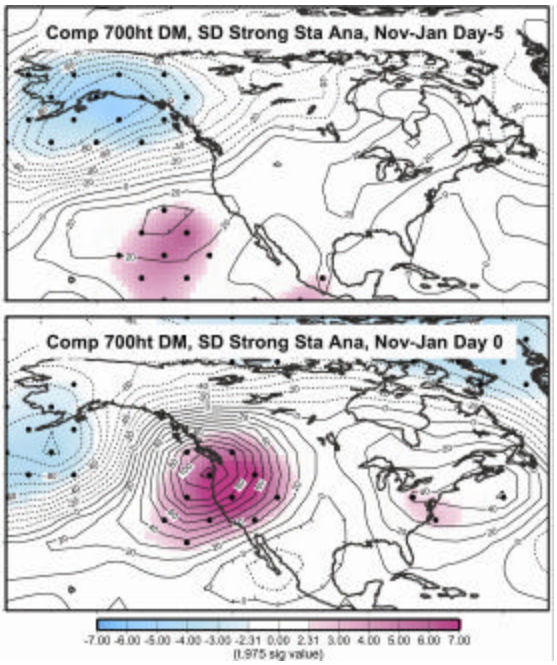


Figure 2. Composite atmospheric circulation for 9 strong Santa Ana events.

Over the last decade, the incidence of Santa Anas has ranged from very infrequent occurrences, such as in the September-March cool season of 1995-1996 when only six days registered as having at least ¼ of their total number of observations as Santa Ana conditions at Miramar/Ely, to very frequent, as in 1999-2000 when 24 days met this criteria. It is interesting that last year's (2003-2004) cool season, notorious for its October-November Southern California conflagration, was only about an average season in terms of the frequency of Santa Ana conditions. A "post mortem" analysis of this situation indicated that both antecedent climate and meteorology played important roles in this wildfire episode. It came in a year within a multi-year drought, which contributed to extensive mortality in western forests and chaparral. Late winter (March-April 2004) precipitation and a cool spring and early summer fostered the growth of grasses that were cured out during a hot summer and autumn in 2003, producing extensive fine fuel coverage. The fires during this episode were fanned by moderate Santa Ana winds; twelve major fires started between October 21st and October 27th in Southern California and another on October 28th near Ensenada in Baja California, Mexico, together burning over 300 thousand hectares by November. All of these were human-caused fires that started in chaparral on or below the western slopes of coastal mountain ranges and burned towards the Pacific Ocean. Their paths to the sea were, in many cases, coincident with some of the most densely populated urban areas in the United States. 25 lives were lost in California and Mexico. 4840 structures were reported lost, including 3471 homes, resulting in over $2 billion in insured claims, and perhaps more than twice that amount in total losses. Over $116 million was spent on fire suppression, $11 million on housing and other assistance, and $26 million was extended in Small Business Administration loans.

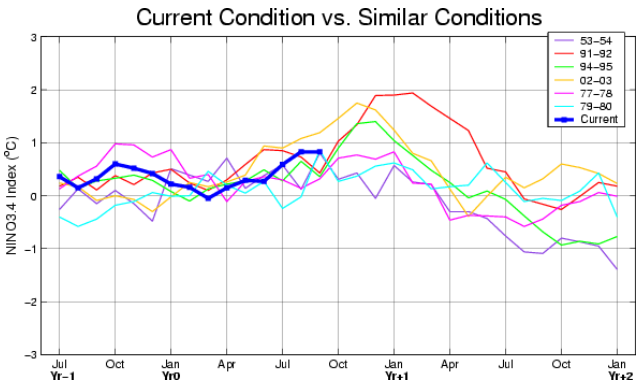
Because the winds that fostered the rapid growth of these fires were not in themselves extraordinary, the events emphasize the importance of developing a better capacity to understand and predict Santa Ana events. Large wildfires in chaparral in autumn and winter months are also not extraordinary events in Southern California, having occurred quite frequently during the last century. Our Southern California region will continue to be vulnerable to these events, especially considering the rapidly growing wildland-urban interface proximate to a population of nearly twenty million people in Southern California, where the population has more than doubled since 1950.

View additional figures on the Climate Watch website: www.calclim.dri.edu

Further reading: Westerling, A.L., D.R. Cayan, T.J. Brown, B.L. Hall and L.G. Riddle 2004: Climate, Santa Ana Winds and Autumn Wildfires in Southern California. *EOS*, **85**(31), 289,296

CLIMATE FORECASTS & OUTLOOKS

ENSO October forecasts:



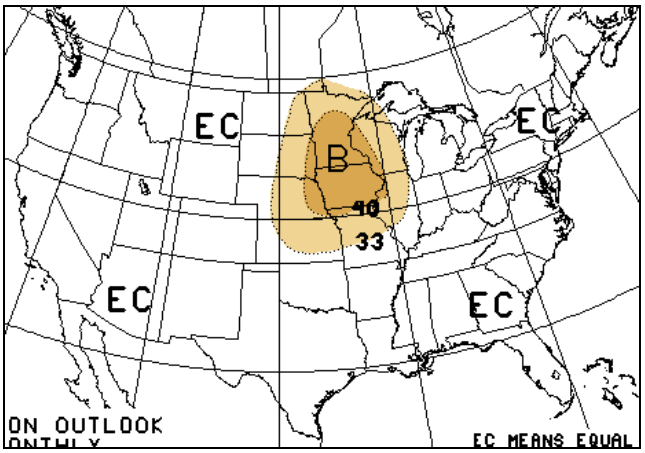
Summary of October 2004 ENSO Forecast

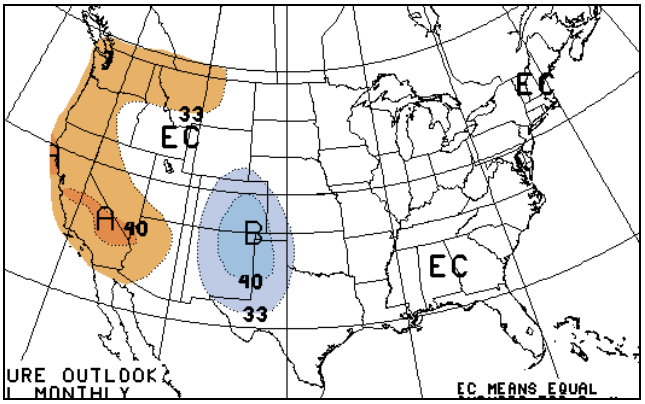
Forecast Period:	Feb. 2005 – Apr. 2005
Probability of El Niño	0 50 100 low medium high
Probability of La Niña	0 50 100 low medium high
Probable Magnitude of Event	weak

Based on sea surface temperature departures from the long-term average over the "Nino 3.4" region (120-170W, 5S-5N).

http://iri.columbia.edu/climate/ENSO/currentinfo/QuickLook.html

Precipitation and Temperature Outlooks:

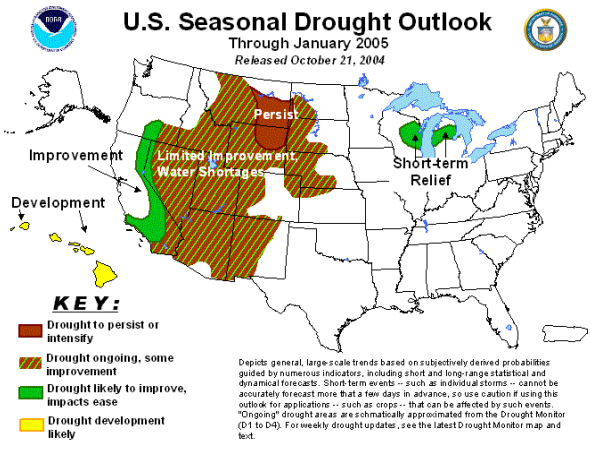


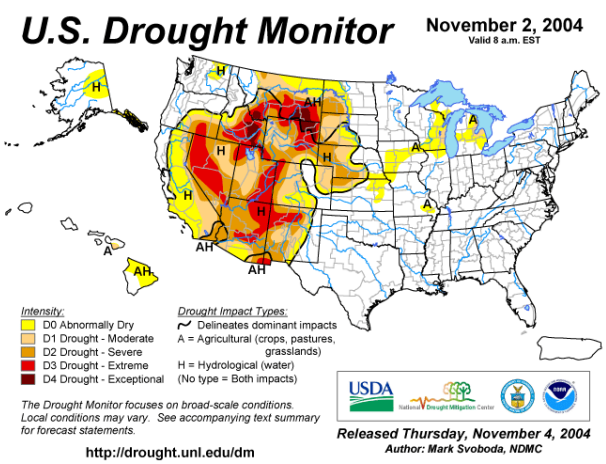


Precipitation Outlook is on the top, Temperature Outlook is on the bottom. "A" means above climatology, "B" means below climatology, and "EC" means equal chances of above, normal, or below climatology.

Source: Climate Prediction Center, http://www.cpc.noaa.gov/

Drought Conditions:





Credit: CPC/NCEP & http://www.drought.unl.edu/dm/monitor.html

October Station Data

All data is provisional and subject to change.

STATION NAME/ CLIMATE DIVISION	TAVG	DEP	TMAX	DEP	MGX	XMX	TMIN	DEP	MGN	XMN	PREC	PDEP	MGP	XPC	PPCT
North Coast	**56.6**	**-1.1**	**67.7**	**6.8**			**45.5**	**4.5**			**4.45**	**2.39**			**200**
Crescent City	54.2	0.1	60.8	-2.2	2	81	47.5	2.1	2	36	7.58	3.02	2	2.05	166
Eureka	54.9	0.4	62.6	1.3	0	74	47.2	-0.5	0	52	5.71	3.35	0	1.59	242
Arcata/Eureka	54.2	-0.3	63.7	2.4	2	86	44.7	-3.0	2	34	4.97	2.61	2	1.22	211
Fort Bragg 5N	54.6	-0.7	63.3	-0.8	5	85	45.8	-0.6	5	53	5.30	2.73	5	2.39	206
Kentfield	59.8	-2.7	69.9	-5.5	1	90	49.7	0.1	1	67	4.26	1.93	1	1.73	183
Napa	60.9	-1.8	72.9	-3.5	1	90	48.9	-0.1	1	59	2.49	1.06	1	1.21	174
Santa Rosa	59.2	-3.6	73.4	-3.5	0	98	44.9	-3.8	0	56	3.55	1.74	1	0.94	196
Ukiah AP	59.1	-2.1	73.7	73.7	0	95	44.5	44.5	0	57	3.74	3.74	0	2.02	0
Yreka	52.9	0.4	69.2	-0.7	1	86	36.7	1.6	1	45	2.48	1.37	1	1.06	223
Sacramento Drainage	**55.0**	**-1.6**	**67.4**	**-4.4**			**42.6**	**1.1**			**5.01**	**2.92**			**262**
Alturas	45.2	-2.6	60.4	-6.9	1	81	30.0	1.9	1	44	2.84	2.11	0	0.88	389
Adin Ranger Stn	49.8	-1.9	63.9	-2.7	1	86	35.6	-0.9	1	47	4.90	3.74	1	2.92	422
Blue Canyon	50.2	-3.9	55.8	-6.5	0	76	44.7	-1.2	0	61	7.74	3.88	0	2.13	201
Burney	49.1	0.8	64.9	-4.9	2	83	33.3	6.5	2	45	3.83	2.14	2	1.23	227
Dunsmuir Treatment	56.3	0.8	72.5	-0.4	3	90	40.1	2.1	3	52	3.98	0.76	2	1.69	124
Grass Valley	55.8	-1.3	66.9	-4.6	0	90	44.6	1.9	0	55	6.66	3.94	0	1.67	245
Marysville	62.7	-2.5	74.7	-5.3	0	97	50.6	0.2	0	61	3.07	1.84	0	1.28	250
Mineral	44.9	-1.8	57.4	-4.7	8	81	32.5	1.2	8	48	5.72	1.99	7	1.28	153
Mt. Shasta	49.1	-1.4	62.4	-2.0	0	82	35.8	-0.8	0	45	7.31	5.10	0	3.75	331
Paradise	62.9	-0.4	71.7	-2.6	0	93	54.1	1.8	0	70	7.98	5.07	0	1.85	274
Portola	44.4	-2.5	59.2	-6.1	12	80	29.5	1.0	12	42	2.48	1.26	2	1.31	203
Quincy	51.8	-0.5	66.9	-6.4	1	87	36.6	5.4	1	49	5.95	3.40	1	2.20	233
Redding	62.4	-0.8	74.3	-4.1	0	96	50.4	2.4	0	70	5.86	3.68	0	3.26	269
Red Bluff FSS	62.7	-2.4	74.5	-4.6	0	95	50.8	-0.3	0	63	2.71	1.36	0	1.09	201
Sacramento AP	62.2	-2.2	73.7	-4.5	0	93	50.6	0.0	0	60	2.72	1.83	0	0.96	306
Sacramento City	63.7	-2.7	75.0	-4.2	0	0	52.5	-1.1	0	0	3.09	2.20	0	0.00	347
Shasta Dam	62.6	-2.5	72.1	-3.5	0	94	53.1	-1.4	0	69	8.29	5.32	0	2.80	279
Northeast Interior	**44.0**	**-4.0**	**59.7**	**-6.0**			**28.2**	**-2.0**			**2.45**	**1.37**			**255**
Boca	45.4	0.0	65.5	-0.2	7	81	25.2	0.2	7	36	3.10	1.72	3	2.27	225
Bodie	36.7	-2.9	55.4	-4.3	2	74	17.9	-1.6	2	31	0.92	0.25	1	0.66	137
Bridgeport	41.6	-2.1	60.3	-4.3	3	78	23.0	0.3	3	36	1.58	1.23	0	1.23	451
Markleeville	48.3	1.4	61.7	-3.4	3	80	34.9	6.3	3	52	1.43	0.21	3	0.83	117
Susanville 2 SW	50.4	0.6	63.8	-2.1	0	80	37.0	3.3	0	50	MSG		4		
Tahoe City	43.9	-2.3	56.5	-3.5	14	73	31.2	-1.1	14	42	4.00	2.05	4	2.35	205
Tahoe Valley AP	41.6	N/A	54.8	N/A	0	73	28.4	N/A	0	43	3.67	2.74	1	1.14	395
Central Coast	**60.7**	**-1.5**	**70.4**	**-3.8**			**50.9**	**0.7**			**3.15**	**2.21**			**385**
Hollister	61.2	-1.4	73.7	-4.5	1	95	48.8	1.8	1	57	2.44	1.80	1	1.01	381
King City	61.4	-1.8	75.9	-4.0	2	99	46.9	0.4	2	59	3.38	2.83	2	1.69	615
Morro Bay	58.6	-0.7	64.0	-4.6	0	87	53.2	3.3	0	60	5.33	4.63	1	2.20	761
Oakland Museum	61.7	-2.0	69.3	-2.8	1	89	54.1	-1.1	1	63	3.10	1.77	2	1.51	233
Paso Robles AP	60.5	-2.0	75.5	-5.0	0	97	45.4	1.0	0	59	3.90	3.39	0	1.86	765
Redwood City	62.0	1.1	71.9	-1.1	1	93	52.1	3.4	1	59	0.26	-0.80	5	0.10	25
Richmond	61.2	-1.3	68.7	-3.1	1	87	53.7	0.6	1	61	2.67	1.42	1	1.12	214
Salinas AP	59.2	-2.4	69.6	-3.4	0	93	48.9	-1.2	0	58	2.79	2.17	0	0.92	450
San Francisco	60.3	-2.2	67.1	-3.3	0	93	53.4	-1.2	0	65	2.59	1.40	0	1.04	218
San Francisco AP	60.8	-0.2	68.4	-1.3	0	90	53.3	0.9	0	59	3.19	2.15	0	1.56	307
San Jose	62.1	-2.0	71.8	-4.1	0	88	52.5	0.2	0	60	1.88	1.01	0	1.09	216
San Luis Obispo	60.8	-3.5	71.7	-7.0	2	94	49.9	0.1	2	61	5.43	4.44	2	1.70	548
Santa Cruz	58.8	-1.6	67.7	-4.8	1	89	49.8	1.5	1	56	4.02	2.58	2	2.68	279

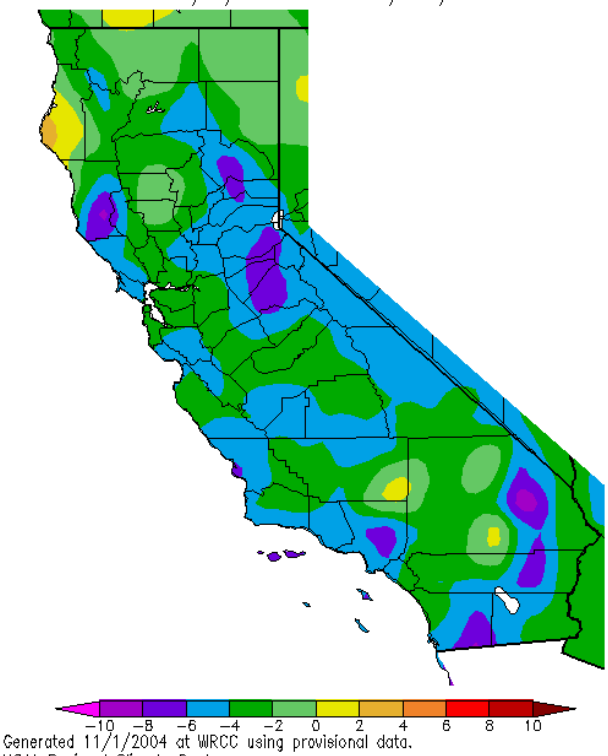
San Joaquin	**58.1**	**-2.4**	**70.2**	**-4.8**			**46.1**	**-0.1**			**3.16**	**2.12**			**341**
Bakersfield	64.8	-2.4	75.7	-3.8	0	94	53.8	-1.1	0	62	1.54	1.24	0	0.96	513
Coalinga	64.3	-2.9	77.2	-5.7	5	94	51.5	0.1	5	59	1.57	1.19	6	0.81	413
Fresno	64.0	-1.0	74.7	-3.4	0	92	53.4	1.5	0	61	2.45	1.80	0	1.05	377
Glennville	53.6	-1.8	67.8	-4.9	2	85	39.4	1.4	2	50	2.30	1.38	3	1.31	250
Grant Grove	46.9	-2.3	55.4	-2.8	5	73	38.4	-1.7	5	51	4.02	1.79	5	1.14	180
Hanford 1 S	62.6	-1.9	75.4	-4.8	0	95	49.9	1.2	0	58	2.06	1.62	0	1.02	468
Lodgepole	41.0	-3.1	52.6	-5.6	7	70	29.4	-0.5	7	37	7.62	5.60	7	3.40	377
Madera	62.2	-2.0	74.8	-5.1	0	91	49.6	1.1	0	58	2.55	1.81	0	0.76	345
Porterville	63.0	-4.7	75.2	-7.3	0	91	50.7	-2.2	0	61	1.48	0.83	0	0.86	228
Stockton WSO	62.6	-2.0	75.9	-2.7	0	93	49.4	-1.1	0	55	2.49	1.67	0	1.30	304
Yosemite	54.4	-2.8	67.0	-6.2	7	82	41.7	0.6	7	54	6.69	4.42	7	2.63	295
South Coast	**60.8**	**-3.6**	**70.0**	**-5.9**			**51.5**	**-1.3**			**5.85**	**5.32**			**1222**
Alpine	62.1	-4.7	72.1	-7.3	13	94	52.2	-2.0	13	67	4.96	4.11	13	1.65	584
Anaheim	66.7	-1.6	76.1	-4.1	3	89	57.2	0.9	3	65	0.18	-0.08	5	0.13	69
Big Bear Lake	44.9	-3.4	58.5	-5.9	11	76	31.3	-0.8	11	41	7.45	6.67	11	3.25	955
Burbank	64.4	-3.2	74.4	-7.1	0	93	54.4	0.8	0	62	5.57	5.02	0	1.62	1013
CAMPO	56.9	-3.7	71.5	-7.9	2	93	42.3	0.5	2	32	6.24	5.59	2	2.64	960
Culver City	61.5	-5.6	67.9	-9.1	17	71	55.1	-2.1	17	60	4.07	3.74	21	1.90	1233
El Cajon	65.6	-1.8	76.1	-4.1	8	97	55.1	0.5	8	64	5.27	4.81	8	1.80	1146
Escondido 2	65.1	-2.9	75.4	-5.6	3	94	54.8	-0.1	3	61	5.90	5.46	3	1.95	1341
Idyllwild Fire D	53.0	-1.3	66.4	-3.2	4	83	39.5	0.5	4	54	7.65	6.55	5	2.65	695
Lompoc	59.1	-3.9	68.7	-7.7	12	81	49.4	-0.2	12	59	5.10	4.62	11	1.08	1063
Long Beach AP	64.8	-3.8	72.2	-6.7	0	82	57.4	-0.9	0	64	5.34	4.94	0	2.04	1335
Los Angeles/USC	65.1	-4.4	73.0	-6.0	0	83	57.2	-2.7	0	64	4.56	4.19	0	2.20	1232
Los Angeles AP	63.6	-3.3	69.5	-4.8	0	74	57.8	-1.6	0	64	3.78	3.42	0	1.61	1050
Mt Wilson No 2	43.9	N/A	50.6	N/A	17	64	37.2	N/A	17	43	8.72	7.18	17	5.59	566
Riverside Citrus	66.5	-1.5	79.9	-3.0	4	99	53.1	0.1	4	60	4.21	3.95	3	1.91	1619
Newport Beach Ha	64.4	-0.7	69.0	-2.2	0	75	59.8	0.8	0	65	3.74	3.46	0	1.77	1336
San Diego AP	65.3	-2.3	69.7	-4.3	0	76	61.0	-0.2	0	67	4.98	4.54	0	2.71	1132
Sandberg WSMO	55.9	-4.0	64.0	-4.3	0	84	47.8	-3.6	0	62	3.35	3.03	0	1.23	1047
Santa Ana Fire	66.2	-2.7	76.0	-3.7	0	88	56.5	-1.5	0	64	6.89	6.53	0	3.15	1914
Santa Barbara AP	59.5	-4.0	69.5	-5.9	0	80	49.4	-2.2	0	60	3.43	2.91	0	1.07	660
Santa Maria AP	58.7	-2.4	69.6	-4.4	0	89	47.7	-0.5	0	60	2.32	1.87	0	1.10	516
UCLA	63.8	-3.3	70.5	-4.7	5	84	57.1	-1.8	5	66	5.24	4.67	5	2.38	919
Southeast Desert	**67.3**	**-2.2**	**81.7**	**-3.6**			**52.9**	**-0.6**			**0.89**	**0.70**			**478**
Bishop	53.9	-2.7	71.3	-4.7	1	86	36.5	-0.6	1	51	0.47	0.27	0	0.43	235
Blythe	72.1	-1.9	84.9	-3.1	0	100	59.3	-0.7	0	68	1.04	0.81	0	0.43	452
Daggett AP	66.8	-1.3	79.2	-3.8	0	95	54.5	1.4	0	64	0.56	0.39	0	0.56	329
Imperial	71.5	-2.9	85.3	-3.8	0	102	57.8	-1.9	0	67	0.93	0.65	0	0.36	332
Inyokern	62.1	-3.6	77.2	-6.0	2	92	47.0	-1.2	2	59	0.45	0.38	7	0.24	643
Lancaster	61.6	-0.2	76.1	-1.6	1	95	47.1	1.3	1	60	1.93	1.63	1	0.95	643
Needles AP	74.7	-0.6	86.1	-2.7	0	102	63.3	1.6	0	74	1.43	1.12	0	0.56	461
Palm Springs	73.1	-2.9	84.9	-6.0	2	104	61.3	0.2	2	50	1.06	0.95	2	0.63	964
Thermal AP	70.9	-2.6	86.3	-4.2	0	103	55.6	-0.9	0	68	0.69	0.55	0	0.53	493
Twentynine Palms	66.0	-3.0	85.4	-0.4	6	98	46.6	-5.6	6	54	0.38	0.21	6	0.32	224
AVERAGES	**58.3**	**-2.4**	**69.9**	**-3.6**	**2**	**88**	**46.8**	**0.2**	**2**	**56**	**4.02**	**2.90**	**2**	**1.78**	**552**

All data is provisional and subject to change.
Normal period is 1971-2000.

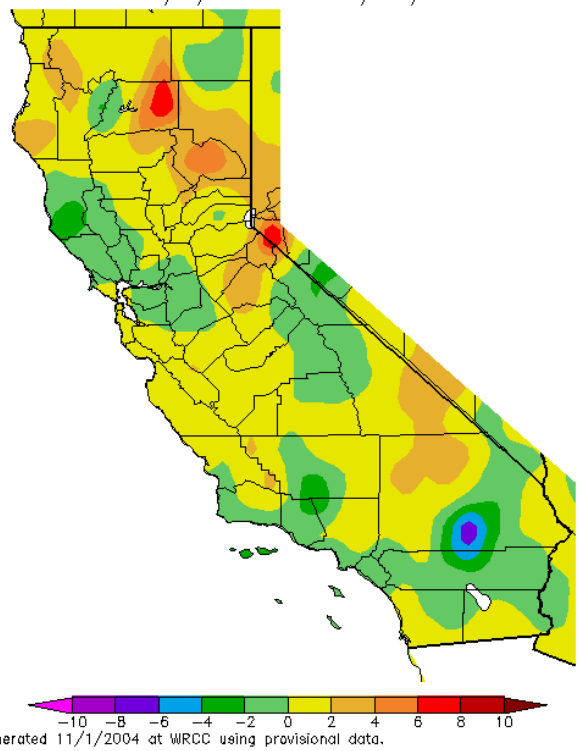
TAVG = average temperature in Fahrenheit
DEP = departure from average
TMAX = average maximum temperature in Fahrenheit
MGX = number of missing daily max temperature values
TMIN = average minimum temperature in Fahrenheit
MGN = number of missing daily min temperature values
MGP = number of missing daily precipitation values
PREC = total monthly precipitation in inches
PDEP = monthly precipitation departure from normal in inches
PPCT = monthly precipitation percent of normal

Climate Maps for October

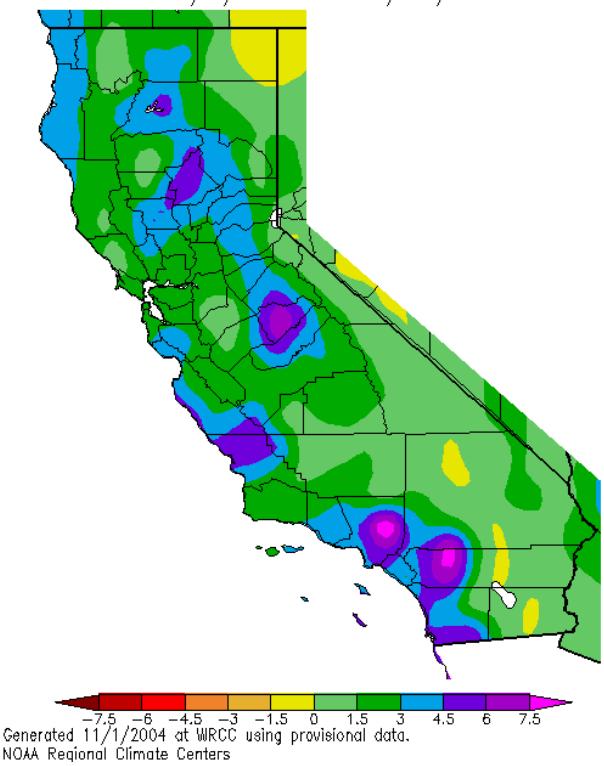
Av. Max. Temperature dep from Ave (deg F)
10/1/2004 – 10/31/2004



Av. Min. Temperature dep from Ave (deg. F)
10/1/2004 – 10/31/2004



Precipitation Departure from Average (in.)
10/1/2004 – 10/31/2004



Percent of Average Precipitation (%)
10/1/2004 – 10/31/2004